CONSTRUCTION AND STANDARDIZATION OF TEACHERS' CORE SELF-EVALUATION SCALE (TCSES)

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ABSTRACT

Core Self-Evaluation (CSE) is a four interrelated higher-order personality trait that represents the fundamental assessment of individuals. It is related with their own worthiness, competence, and capability. It reflects how people evaluate themselves and their functioning in the world. Teachers with high CSE tend to have better classroom management, adapt more positively to educational reforms like NEP 2020, and be more resilient and professionally satisfied. Developing a Teachers' Core Self-Evaluation Scale (TCSES) is essential for understanding and improving the personal and professional effectiveness of teachers, especially in the context of dynamic educational reforms like National Education Policy 2020 in India focusing on teachers' autonomy, professional development, and reflective teaching practices as a whole to form a quality teacher. In this article researcher has described step by step procedure to construct and standardize Teachers' Core Self-Evaluation Scale (TCSES).

1. INTRODUCTION

Research tool is an instrument by using it properly; researcher can depict the answer of research question. Some desirable characteristics of a tool are validity, reliability, objectivity, sensitivity and practicability. Different types of tools are used according to the objectives of the research. A rating scale is a tool used to measure attitudes, perceptions, or opinions by assigning a numerical or descriptive value to different levels of agreement or satisfaction. It's a closed-ended statements type that provides a structured way to collect data, allowing researchers to quantify and analyse responses. A Core Self-Evaluation Scale (CSES) was developed by Judge et al. (2003) with 12-items. In this study researcher had developed and constructed a Teachers' Core Self-Evaluation Scale with 35 items to understand the inner strength of teachers with self-worth, control, confidence, belief in their capacity to innovate and adaptive nature, tolerance for stress and pressure in the educational environment.

1.1. Tool for this Study

To discern the answer of the research questions for the present study researcher has developed Five point Likert scale 'Teachers Core Self-Evaluation scale' (TCSES). To construct and standardize this scale researcher has followed some key steps (Singh, 2023).

1.2. Steps to Construct and Standardize the Rating Scale
1.2.1. Planning to Construct the Tool

In this first step researcher has specified the objectives of the research in crystalline. Then it is decided to identify the dimensions of the tool, nature of the items, types of instructions, method of sampling, arrangement of different types of administration, length and time limit to complete the tool, probable statistical methods for tool construction and standardization. In this study the objectives those are related to Core Self- Evaluations are to find out Core Self-Evaluation of teachers.

1.2.2. Operational Definition of Core Self-Evaluation of Teachers

In this study it is defined as teachers' perception about his/her oneself and basic evaluation. It focuses on stable personality traits which encircles a teachers' consciousness, fundamental evaluation about him/herself, own abilities and their own control. It is the indicator of four traits like i. Generalized self-efficacy, ii. Self-esteem, iii. Locus of control and iv. Neuroticism. Main aim is to find out the core self-evaluation of teachers.

1.2.3. Select Dimensions and Item Writing

To construct Teachers' Core Self-Evaluation Scale, firstly the researcher has adopted the dimensions of the scale from the higher-order personality construct 'Core Evaluation' by Judge, Locke, Durham & Kluger (1998) and items were designed by the researcher. The items were grouped under four dimensions i.e. D1- Generalized Self-Efficacy, D2- Self-Esteem, D3- Locus of Control, and D4- Neuroticism. This step was generated a pool of items for the Teachers' Core Self-Evaluation scale (TCSES) after analysing literature review and previous related scales. On the basis of comprehensive information and understanding, the researcher prepared initial draft of 75 items that helps to find out the teachers' Core Self-Evaluation. These items were based on the selected dimensions.

Sl.No.	Dimensions Name	Dimensions Code	Items Number
1	Generalized Self-Efficacy	D_1	20
2	Self-Esteem	D_2	18
3	Locus of Control	D_3	18
4	Neuroticism	D_4	19
	Total Items		75

Table 1: Distribution of Items in the Initial Draft

The first initial draft of the scale consisted of 75 items were treated for the initial try-out.

1.2.4. Initial Try-Out
The initial try-out was done to find out the suitability of the language for the teachers (target group), the extent to which the items were able to assess the Core Self-Evaluation (variable) of the study and item analysis by the discrimination index or validity index. Mainly three levels of initial try-out were administered to fulfil the purpose (Sansanwal, 2020).

1.2.4.1. Expert Level
Researcher has sent the draft tool along with objectives, operational definition, name of the dimensions of the variable, dimension wise serial number of the 75 items to prelisted 12 experts in research methodology, especially tool development. From this list 5 experts responded to examine each item carefully in the light of objectives, operational definition, dimensions and language. After initial subjective at a glance judgement (face validity) of the experts about the tool, the researcher had dropped the 'non-essential (ne)' tagged items and modified 'useful but non-essential' (u/ne) tagged items as per experts' suggestion. After expert level try-out items had reduced from 75 to 55.

Sl. No.	Dimensions Name	Items Number
1	Generalized Self-Efficacy	15
2	Self-Esteem	15
3	Locus of Control	13
4	Neuroticism	12
	Total Items	55

Table 2: Distribution of Items after Experts' Suggestion

1.2.4.2. Individual Level
Following the previous steps the researcher had dropped and modified the items according to the experts' suggestion, now researcher had carried out the individual try-out to assess the suitability of items with respect to the language weather respondents were able to understand the items. These 15 respondents (school teachers of secondary level) were randomly selected from three schools of 2 districts, Howrah and Kolkata of West Bengal. As per the individual response researcher had modified 7 items from the dimensions of Locus of Control and Neuroticism.

1.2.4.3. Group Level
The main purpose of group level try-out is to do item analysis. Item analysis of the Likert scale was processed into two phases.

The first phase was Qualitative Item Analysis and second phase was Quantitative Item Analysis (Anastasi & Urbina, 2024). In this level 50 respondents (school teachers of secondary level) were randomly selected from 9 schools of two districts, Howrah and Kolkata of West Bengal and 5 point Likert scale with 55 items were used.

1.2.4.3.1. Qualitative Item Analysis (Content Validity Index)
Qualitative item analysis is the process of evaluating and refining the content, clarity, relevance, and wording of items (statements) in a scale based on expert judgment, or feedback. Qualitative item analysis, particularly through the Content Validity Index (CVI), is used to assess how well the items of a scale represent the construct being measured. Content Validity evaluates how well the Likert Scale covers all relevant parts of the construct it aims to measure. Here, a construct is a theoretical concept, theme, or idea: in particular, one that cannot usually be measured directly. This is a crucial step in scale development. To calculate Content validity it is required to measure Content Validity Ratio (CVR) from judging panel of experts. Researcher had considered only the 'essential (e)' tagged items from the experts' evaluation. Calculation of CVR helps to identify the Accepted (A) or Rejected (R) items according to the different dimensions.

$$CVR = \frac{N_e - N/2}{N/2}$$

Where, Ne = Numbers of experts panellists indicating 'essential'
N = Total number of expert panellists

Items	Exp-1	Exp-2	Exp-3	Exp-4	Exp-5	CVR	A/R
1	e	e	e	e	e	1	A
2	e	e	e	e	e	1	A
3	e	e	e	e	e	1	A
4	e	e	e	e	e	1	A
5	e	e	e	e	e	1	A
6	e	e	e	e	e	1	A
7	e	e	e	e	e	1	A
8		e	e		e	0.2	R
9	e	e	e	e	e	1	A
10	e	e	e	e	e	1	A
11	e	e	e	e	e	1	A
12	e	e		e		0.2	R
13	e	e	e	e	e	1	A
14	e	e	e	e	e	1	A
15	e	e	e	e	e	1	A
16	e	e	e	e	e	1	A
17	e	e	e	e	e	1	A
18	e	e	e	e	e	1	A
19	e	e	e	e	e	1	A

20	e	e	e	e	e	1	A
21	e	e	e	e		0.6	A
22	e	e	e	e	e	1	A
23	e	e	e	e	e	1	A
24	e	e	e	e	e	1	A
25	e	e	e	e	e	1	A
26	e	e	e	e	e	1	A
27		e	e	e		0.2	R
28	e	e	e	e	e	1	A
29	e	e	e	e	e	1	A
30	e	e	e	e	e	1	A
31	e	e	e	e	e	1	A
32	e	e	e	e	e	1	A
33	e	e	e	e	e	1	A
34	e	e	e	e	e	1	A
35	e	e	e	e	e	1	A
36	e	e	e	e	e	1	A
37		e	e	e		0.2	R
38	e	e	e	e	e	1	A
39	e	e	e	e	e	1	A
40	e	e	e	e	e	1	A
41	e	e	e	e	e	1	A
42	e	e	e	e	e	1	A
43	e	e	e	e	e	1	A
44	e	e	e	e	e	1	A
45	e	e	e	e	e	1	A
46	e	e		e		0.2	R
47	e	e	e	e	e	1	A
48	e	e	e	e	e	1	A
49	e	e	e	e	e	1	A
50	e	e	e	e	e	1	A
51	e	e	e	e	e	1	A
52	e	e	e	e	e	1	A
53	e	e	e	e	e	1	A
54	e	e	e	e	e	1	A
55	e	e	e	e	e	1	A

Table 3: Content Validity Ratio (CVR) of Items

CVI = Average of CVR score of all the items in the scale

$$CVI = \frac{Total\ CVR}{Total\ Items}$$

$$So,\ CVI = \frac{50.6}{55}$$

$$= 0.92$$

The calculated CVI is 0.92 which is very close to the Lawshe's critical CVR value (for 5 experts) 0.99. So, the CVI indicates the items are relevant and appropriate.

Sl. No.	Dimensions Name	Items Number
1	Generalized Self-Efficacy	13
2	Self-Esteem	14
3	Locus of Control	12
4	Neuroticism	11
	Total Items	50

Table 4: Distribution of Items after Qualitative Item Analysis (Content Validity)

1.2.4.3.2. Quantitative Item analysis (Item Discrimination Index)

To analyse the items of the scale with 50 statements quantitatively, researcher had accomplished Item Discrimination Index. The discrimination index shows us how well an item is differing between respondents with high and low overall scores. Different types of item discrimination methods are used to analyse the item discrimination. Item Total Correlation is more preferred method to analyse the items discrimination of Likert Scale. **(Celen & Aybek, 2022)**. It is a correlation between the score of a single item and total score of the rest of the scale (excluding that item). It helps us to determine the consistency of item alignment with the overall scale. To determine the correlation Pearson correlation coefficient is calculated with individual item's scores and total scores (excluding that item). Researcher had calculated the correlation coefficient had done with 50 items from 50 respondents.

Item No	Pearson Correlation Coefficient (r)	Accept/ Reject
1	0.43	Accept
2	0.57	Accept
3	0.28	Reject
4	0.46	Accept
5	0.61	Accept
6	0.59	Accept
7	-0.13	Reject
8	0.44	Accept
9	0.23	Reject
10	0.51	Accept
11	0.49	Accept
12	0.29	Reject
13	0.68	Accept
14	0.56	Accept
15	0.63	Accept
16	0.57	Accept
17	0.21	Reject
18	0.43	Accept
19	0.46	Accept
20	0.40	Accept
21	0.33	Reject
22	0.65	Accept
23	0.58	Accept
24	0.19	Reject

25	0.45	Accept
26	0.51	Accept
27	-0.13	Reject
28	0.69	Accept
29	0.58	Accept
30	0.53	Accept
31	-0.23	Reject
32	0.65	Accept
33	0.59	Accept
34	0.27	Reject
35	0.66	Accept
36	0.63	Accept
37	0.26	Reject
38	0.54	Accept
39	0.53	Accept
40	0.48	Accept
41	0.28	Reject
42	0.46	Accept
43	0.50	Accept
44	0.31	Reject
45	0.47	Accept
46	-0.22	Reject
47	0.56	Accept
48	0.17	Reject
49	0.68	Accept
50	0.69	Accept

Table 5: Pearson Correlation Coefficient of Items (Item Total Correlation)

Researcher had rejected 15 items with very low correlation coefficient; r values were between -0.23 to 0.39. Afterward, the items analysis 35 items showed high and moderate correlation coefficient; r values lie in between 0.40 to 0.69. After quantitative item analysis (item discrimination) 35 items had been accepted for final try-out.

Sl. No.	r value	No of Items	Accept/Reject
1	0.40 to 0.69	35	Accept
2	-0.23 to 0.39	15	Reject

Table 6: Range of Pearson Correlation Coefficient (r) of Items (Item Total Correlation)

Sl. No.	Dimensions Name	Items Number
1	Generalized Self-Efficacy	9
2	Self-Esteem	8
3	Locus of Control	8
4	Neuroticism	10
	Total Items	35

Table 7: Distribution of Items after Quantitative Item Analysis (Item Discrimination Index)

1.2.5. Final Try-Out

The last step of construction, development and standardization of a scale is final try-out. The main purpose of final try-out is to establish reliability, validity and norms. After the initial try-out those items were not fulfil the criteria have been rejected. The remaining items were arranged in a final scale format. Final distributions of dimension wise items with positive and negative items are Table: 1.8 &1.9

Sl. No.	Dimension Name	Dimension Codes	Items No.		No. of Items	Total
1	Generalized Self-Efficacy	D_1	Positive	1, 2, 3, 5, 6, 7,8	7	9
			Negative	4,9	2	
2	Self-Esteem	D_2	Positive	10, 11, 13, 14, 15, 16	6	8
			Negative	12,17	2	
3	Locus of Control	D_3	Positive	20, 21, 22, 24	4	8
			Negative	18, 19, 23, 25	4	
4	Neuroticism	D_4	Positive	26, 29, 30, 31, 33, 34, 35	7	10
			Negative	27, 28, 32	3	

Table 8: Dimension wise number of Items

Sl. No.	Types of Items	Serial number of items	Total
1	Positive Items	1, 2, 3, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16, 20, 21, 22, 24, 26, 29, 30, 31, 33, 34, 35	24
2	Negative Items	4, 9, 12, 17, 18, 19, 23, 25, 27, 28, 32	11
Total Items			35

Table 9: Serial number wise distribution of items in Positive and Negative type

1.2.5.1. Scoring Criteria

The scoring criteria of a scale refer to the rules or system used to assign numerical values to responses on the scale. These criteria help convert qualitative data into quantitative scores for analysis. The score criteria of the TCSES are assigned Table: 1.10. The minimum and maximum scores of the scale are **35-175**

Types of Items	Strongly Agree (SA)	Agree (A)	Undecided (U)	Disagree (D)	Strongly Disagree (SD)
Positive	5	4	3	2	1
negative	1	2	3	4	5

Table 10: Scoring Criteria

1.2.5.2. Reliability

Reliability refers to the consistency or stability of the scale. Different methods are used to assess the reliability of a scale. In this study researcher has applied two types of methods, like Test-Retest and Internal Consistency Reliability.

1.2.5.2.1. Test- Retest

Test-retest reliability is a method used to assess the stability and consistency of the 5-point Likert scale over time. Here, researcher had applied 5 point Likert scale with 35 items to 50 teachers initially and after 21 days the same scale was applied to the same respondents in second attempt. After getting the raw scores of two sets, Pearson correlation coefficient (r) was calculated.

1.2.5.2.2. Internal Consistency

Internal consistency measures how well the items in a scale are related to each other and assess the same construct. Calculating the mean and variance of each item of the scale researcher had calculated the Cronbach's alpha. Both coefficient values are mentioned in the Table: 1.11. Both Pearson correlation coefficient (r) value and Cornbach's Alpha value showed good reliability of the scale.

Sl. No.	Reliability	Coefficient Value
1	Test-Retest (Pearson correlation coefficient (r)	0.87
2	Internal Consistency (Cornbach's Alpha)	0.79

Table 11: Reliability Coefficient Values of the Scale

1.2.5.3. Validity

Validity refers to the extent to which a scale measures what it is intended to measure. In this study researcher has assessed validity through Face validity, Content Validity and Factorial Validity. Both face and content validity were discussed in initial try-out. In this section Factorial validity has discussed in detail.

1.2.5.3.1. Factorial Validity

Factorial validity refers to the degree to which a scale accurately reflects the under lying theoretical factor structure it is intended to measure. It is a type of construct validity and is typically assessed using factor analysis, which helps determine whether the items on a scale group together in a way that aligns with the expected theoretical constructs or dimensions. In this study researcher was developing Core Self-Evaluation (CSE) scale for teachers and she used the same theoretical dimensions as Judge et al. (i.e., self-esteem, self-efficacy, locus of control, neuroticism) but with new items designed as per research objectives, the approach is to establish Confirmatory factor analysis.

1.2.5.3.2. Confirmatory Factor Analysis

To assess the factorial validity of a Core Self-Evaluation (CSE) scale for teachers, the most appropriate method is Confirmatory Factor Analysis (CFA), because it has already a theoretical model (Gnambs & Schroeders, 2024). It is applied when researcher expects the factors (dimensions) to be correlated with each other, rather than completely independent.

Factor 1 (D_1.Generalized Self-Efficacy): Item 1-9
Factor 2 (D_2.Self-Esteem): Item 10-17
Factor 3 (D_3.Locus of Control): Item 18-25
Factor 4 (D_4.Neuroticism): Item 26-35

Item	Factor 1	Factor 2	Factor 3	Factor 4
$D_1 1$	**0.82**	0.31	0.37	0.44
$D_1 2$	**0.78**	0.26	0.20	0.29
$D_1 3$	**0.80**	0.23	0.29	0.34
$D_1 4$	**0.79**	0.19	0.17	0.11
$D_1 5$	**0.83**	0.09	0.05	0.10
$D_1 6$	**0.75**	0.11	0.18	0.09
$D_1 7$	**0.76**	0.07	0.10	0.12
$D_1 8$	**0.81**	0.13	0.18	0.15
$D_1 9$	**0.73**	0.08	0.06	0.03
$D_2 10$	0.12	**0.74**	0.18	0.15
$D_2 11$	0.09	**0.82**	0.15	0.20
$D_2 12$	0.25	**0.79**	0.32	0.38
$D_2 13$	0.07	**0.77**	0.03	0.09
$D_2 14$	0.18	**0.81**	0.12	0.14
$D_2 15$	0.11	**0.75**	0.41	0.37
$D_2 16$	0.31	**0.84**	0.36	0.28
$D_2 17$	0.06	**0.85**	0.28	0.17
$D_3 18$	0.05	0.04	**0.69**	0.11
$D_3 19$	0.08	0.09	**0.73**	0.06
$D_3 20$	0.17	0.12	**0.78**	0.19
$D_3 21$	0.29	0.28	**0.81**	0.22
$D_3 22$	0.14	0.13	**0.79**	0.17
$D_3 23$	0.33	0.31	**0.67**	0.37
$D_3 24$	0.14	0.19	**0.77**	0.16
$D_3 25$	0.41	0.39	**0.80**	0.49
$D_4 26$	0.19	0.11	0.35	**0.84**
$D_4 27$	0.16	0.21	0.27	**0.79**
$D_4 28$	0.07	0.10	0.10	**0.73**
$D_4 29$	0.23	0.18	0.29	**0.68**
$D_4 30$	0.29	0.26	0.31	**0.77**
$D_4 31$	0.11	0.14	0.16	**0.69**
$D_4 32$	0.21	0.27	0.24	**0.70**
$D_4 33$	0.09	0.06	0.10	**0.81**
$D_4 34$	0.13	0.17	0.23	**0.78**
$D_4 35$	0.24	0.20	0.17	**0.65**

Table 12: Confirmatory Factor Analysis Matrix (Item wise Factor Loading)

1.2.5.3.2.1. Factor Loadings

From Factor 1 (D_1.Generalized Self-Efficacy): Item 1-9, **$D_1 5$** item loaded highly i.e. 0.83. It indicating strongly represents that construct. All other items of this factor loaded 0.73 to 0.82. Similarly, Factor 2 (D_2.Self-Esteem): Item 10-17, **$D_2 17$** item showed strong loadings i.e. 0.85 on Factor 2 and all other items of this factor loaded 0.74 to 0.84. Factor 3 (D_3. Locus of Control): Item 18-25, item **$D_3 21$** showed strong load

i.e. 0.81 and others items showed 0.67 to 0.80. Factor 4 (D_4. Neuroticism): Item 26-35, item $D_4 26$ showed loaded highly i.e. 0.84 and others items showed 0.65 to 0.81. So, from the above matrix it is showed that the items on a scale group together in a way that aligns with the expected theoretical constructs or dimensions.

1.3.5.4. Statistical Results:
On the basis of the scores from a sample of 50 respondents, the raw scores are dispersed from 98 to 171. The statistical results are given in Table: 1.13

Features	Statistics
Sample	50
Sore Range	35-175 (as per scale score)
	98-171 (as per actual score)
Mean	148.14
Median	152
Variance	341.7204
SD	18.485
SDE	2.61
Skewness	-0.61(moderately negatively skewed)
Kurtosis	-0.45 (platykurtic)

Table 13: Descriptive Statistical Results

1.3.5.5. Norms
After calculating the reliability and validity of a scale, the researcher has established the norms. It is established using the raw scores of the scale to convert the z-score. Below tabulated result showed that the scores of the scale are normally distributed.

Sl. No.	Raw Score Range	z- Score Range	Level of Core Self-Evaluation of Teachers
1	170 & above	1.18 & above	Very high
2	160-169	0.64 to 1.13	High
3	150-159	0.10 to 0.59	Above Average
4	140-149	−0.44 to 0.05	Average
5	130-139	−0.98 to −0.49	Below Average
6	120-129	−1.52 to −1.04	Poor
7	119 & below	−1.58 & below	Very poor

Table 14: Norms for interpretation of the level of Teachers' Core Self-Evaluation Scale

1.3. Ethical Consideration:
During constructing, validating, and administering a Teachers' Core Self-Evaluation (TCSES) Scale, several ethical principles were followed strictly to ensure respect, fairness, and integrity in educational research and practice. Teachers were clearly informed consent about the purpose of the tool, it was voluntary, and it maintained the anonymity and confidentiality. This scale is also free from emotional discomforts of the teachers and any types of cultural sensitivity. Participants had fully right to withdraw to skip any item they were uncomfortable for

answering and exit the study at any time, without needing to justify.

Sl. No.	Statements	SA	A	U	D	SD
D_1. Generalized Self-Efficacy						
1	I am able to complete my lessons within time.					
2	I reinforce my students positively when they face difficulties.					
3	I can achieve my goals that I have predetermined.					
4	I like to compare my teaching efficacy with others.					
5	I am confident that I can do most of my teaching related work efficiently.					
6	I believe students' terminal behavior to study make me more enthusiastic after completing a new lesson.					
7	I believe that observational learning is important technique to achieve desired learning outcome.					
8	My positive verbal persuasions encourage my students to do their team work.					
9	I blaming every one as well as my luck when I face any negative imbalanced situation.					
D_2. Self-Esteem						
10	I can say 'No' when any awkward situation comes within and outside the classroom.					
11	I believe self-care and self-love are selfishness.					
12	I accept my mistakes and learn from my students, colleagues and my seniors.					
13	I like to do my work independently.					
14	I know and accept my limitations positively when any criticism comes from colleges as well as my students.					
15	I am aware to overcome my maximum limitations.					
16	I get respect from my students, colleagues, seniors as well as non-teaching staffs.					
17	I believe that mistakes cannot help us to grow without fear of rejection.					
D_3. Locus of Control						
18	I usually convince my colleagues to do the things on my way.					

19	I am convinced by my students, colleagues and others easily.				
20	I don't interfere others for my personal interest.				
21	I think rationally when I take any vital decision of my life.				
22	I think rationally when I take decision of other's life.				
23	I change my decision after hearing other's talk.				
24	I believe hard work and smart work usually lead to success.				
25	External environment always affect me to fulfill my aim within time.				
D$_4$.	Neuroticism				
26	I can overcome steadily the 'Day-1' situation of my working area.				
27	I feel hesitate to break the ice with my newly coming students and colleagues.				
28	I feel nervous when students ask me some odd questions.				
29	I never feel inferior when my colleague do better performance than me.				
30	I like to break my comfort zone.				
31	I get challenges positively in my professional field.				
32	I have a gloomy outlook of my future.				
33	I don't feel angry for repetition of my students query on subject matter.				
34	I never feel depressed during my difficult time of my professional life.				
35	I am very organized in my professional field.				

Table 15: Standardized 5 point Likert Teachers' Core Self-Evaluation Scale (TCSES)

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